Missouri Solid Waste Diversion and Recycling
Status Report
For Calendar Year – 2000

Solid Waste Management Program
Planning and Fiscal Management Section

INTRODUCTION:

Senate Bill 530, signed into law in 1990, established a statewide solid waste diversion goal of 40%. Since 1990 the Department of Natural Resources' Solid Waste Management Program has tracked the amount of waste Missouri diverts from landfills. During that time a significant increase in the amount of diverted waste has been observed. This report will discuss various factors involved in determining the amounts of diverted waste. The report also provides information regarding benefits associated with materials that have been recovered from the waste stream.

BACKGROUND:

Tracking the progress of waste diversion in Missouri has undergone a series of changes. From a practical standpoint it has been shown that a waste generation rate must be determined prior to determining a waste diversion rate. It so happens that the most challenging aspect of determining waste diversion estimates is the accurate assessment of the amount of waste generated. The original method for estimating waste generation, established in 1990, utilized a fixed annual per-capita generation rate of 1.47 tons. This amount was then multiplied by Missouri's population for any given year to render a total waste generation figure.

For calendar year 1999, the Solid Waste Management Program developed a new method, Variable Generation Rate (VGR) Method, for determining waste generation. The VGR linked the relative economic climate as indicated by personal expenditures to the quantity of waste generated for reuse, recycling or disposal by Missourians. Waste diversion estimates, for calendar years 1990 through 2000, derived from this method and the original method are shown in Table 1.

Traditionally in Missouri the total amount of waste diverted from landfills included waste that had been reduced, reused or recycled during any given year. The combining of the three waste management strategies to determine the diversion rate was necessary as the Solid Waste Management Program had no way to determine the relative amounts for each of the strategies. As well, not knowing the percentage of Municipal Solid Waste (MSW), waste generated in households, commercial establishments, institutions, and light industries, in the waste stream was also a hindrance in attempting to utilize the Environmental Protection Agency's calculation formulas for measuring recycling and composting rates of MSW.

This changed for calendar year 1998 when Solid Waste Management Program planners were able to begin estimating MSW waste generation and recycling rates for Missouri. This came as a result of the completion of the *Missouri Solid Waste Composition Study,* conducted by the Midwest Assistance Program. The Composition Study indicated that approximately 59.6 percent of the waste stream is composed of MSW. The study also provided statewide estimates for types of materials found in Missouri landfills. These estimates were essential for determining the MSW recycling rates for different types of materials. See Figure 1 for MSW recycling tonnage rates for calendar years 1998, 1999 and 2000. The Solid Waste Management Program has estimated that for the calendar years 1998, 1999 and 2000, a total of 6,406,914 tons of municipal solid waste were recycled by Missouri.

For calendar year 2000 the Solid Waste Management Program started figuring the impact Missouri recycled materials had on greenhouse gas (GHG) reduction, energy use and energy cost for Missouri (see Figure 2). These figures were determined by using a spreadsheet model titled *Estimating the Environmental Benefits of Recycling*, developed by Edward Boisson of the Northeast Recycling Council in August 1999.

DISCUSSION:

The Solid Waste Management Program promotes an integrated waste management hierarchy to manage solid waste in Missouri. Integrated waste management means managing waste by a combination of methods. These methods include waste reduction, materials reuse, recycling, composting, incineration with energy recovery and landfilling.

Although waste reduction is at the top of the hierarchy model, today's products, lifestyles and business practices will continue to cause a great deal of waste material to be generated at home, work or leisure. Recycling is the waste management option that generally diverts the greatest amount of material from the waste stream. In Missouri, as in its neighboring states, landfill costs have not risen as significantly as in some parts of the U.S., making it more critical to use careful planning to create sustainable programs. For some materials, both the distance to markets and fluctuations of the markets make recycling a risky venture. However, Missouri has made progress and continues to increase recycling opportunities across the state.

While many may think so, the greatest environmental benefits of recycling are not necessarily related to saving landfill space, but to the conservation of energy and natural resources and pollution prevention in manufacturing. Recycling provides a cost-effective source of materials for manufacturers, which creates jobs and may reduce the cost to consumers.

Next to reuse, recycling is the most energy conserving of all waste management strategies. Numerous industry and government studies have repeatedly documented that the collection and use of secondary materials results in large energy savings over traditional production and disposal methods. Net energy savings may vary from product to product and region to region, as well as from production facility to facility, but there is no doubt that energy use reductions are realized across the board by recycling.

Recycling reduces fossil fuel combustion associated with product manufacturing and, as a result, GHGs that contribute to climate change by increasing the ability of the atmosphere to trap heat are reduced. Recycling decreases the amount of organic waste that is landfilled, thereby decreasing landfill methane emissions. Recycling also reduces emissions of conventional pollutants associated with fossil fuel combustion and eliminates energy emissions associated with manufacturing materials.

Overall, in the big scheme of things, Missouri is doing well in the area of waste diversion and recycling. According to the December 2001 edition of *Biocycle* magazine, Missouri ranks eighth in the nation with a waste diversion rate of 38 percent.

Calendar Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Population	5,117,073	5,157,507	5,193,872	5,237,867	5,281,280	5,226,784	5,358,692	5,402,058	5,438,559	5.468,338	5,595,211
Waste Generated in Missouri (Fixed Generation Method)	7,540,000	7,581,535	7,634,992	7,699,664	7,763,482	7,660,801	7,896,025	7,941,025	7,994,682	8,038,458	8,224,960
Waste Generated in Missouri (Variable Generation Method)	7,540,000	7,623,009	7,844,367	8,107,229	8,411,680	8,563,780	8,771,303	9,048,000	9,227,853	9,559,890	10,288,232
Solid Waste Disposed of in Missouri Landfills	5,400,000	5,269,846	4,751,816	4,731,633	4,075,174	4,121,753	3,640,337	4,118,739	4,464,357	4,570,496	4,759,493
Solid Waste Imported from Other States	Data Not Available	Data Not Available	Data Not Available	Data Not Available	Data Not Available	171,043	65,210	159,209	143,358	175,275	183,042
Total In-State Disposal	5,400,000	Data Not Available	Data Not Available	Data Not Available	Data Not Available	3,950,710	3,575,127	3,959,530	4,320,999	4,395,221	4,576,451
Solid Waste Exported By Missouri to other States	1,400,000	Data Not Available	Data Not Available	Data Not Available	Data Not Available	1,750,515	1,755,606	1,569,033	1,551,417	1,751,690	1,792,753
Solid Waste Disposed by Missouri	6,800,000	6,442,395	5,797,644	5,623,663	5,852,177	5,701,225	5,330,733	5,528,563	5,872,416	6,146,911	6,369,204
* Waste Diversion (Fixed Generation Method)	740,000	1,139,140	1,837,348	2,076,001	1,911,305	1,959,576	2,565,292	2,412,462	2,141,301	1,891,546	1,855,756
* Waste Diversion (Variable Generation Method)	740,000	1,180,614	2,046,723	2,483,566	2,559,503	2,862,555	3,440,570	3,519,437	3,355,437	3,412,979	3,919,028
Percent Waste Diversion (Fixed Generation Method)	10%	15%	24%	27%	25%	26%	33%	30%	27%	24%	23%
Percent Waste Diversion (Variable Generation Method)	10%	15%	26%	31%	30%	33%	39%	39%	36%	36%	38%

***** Waste Diversion includes waste reduction, reuse, recycling and composting

Table 1

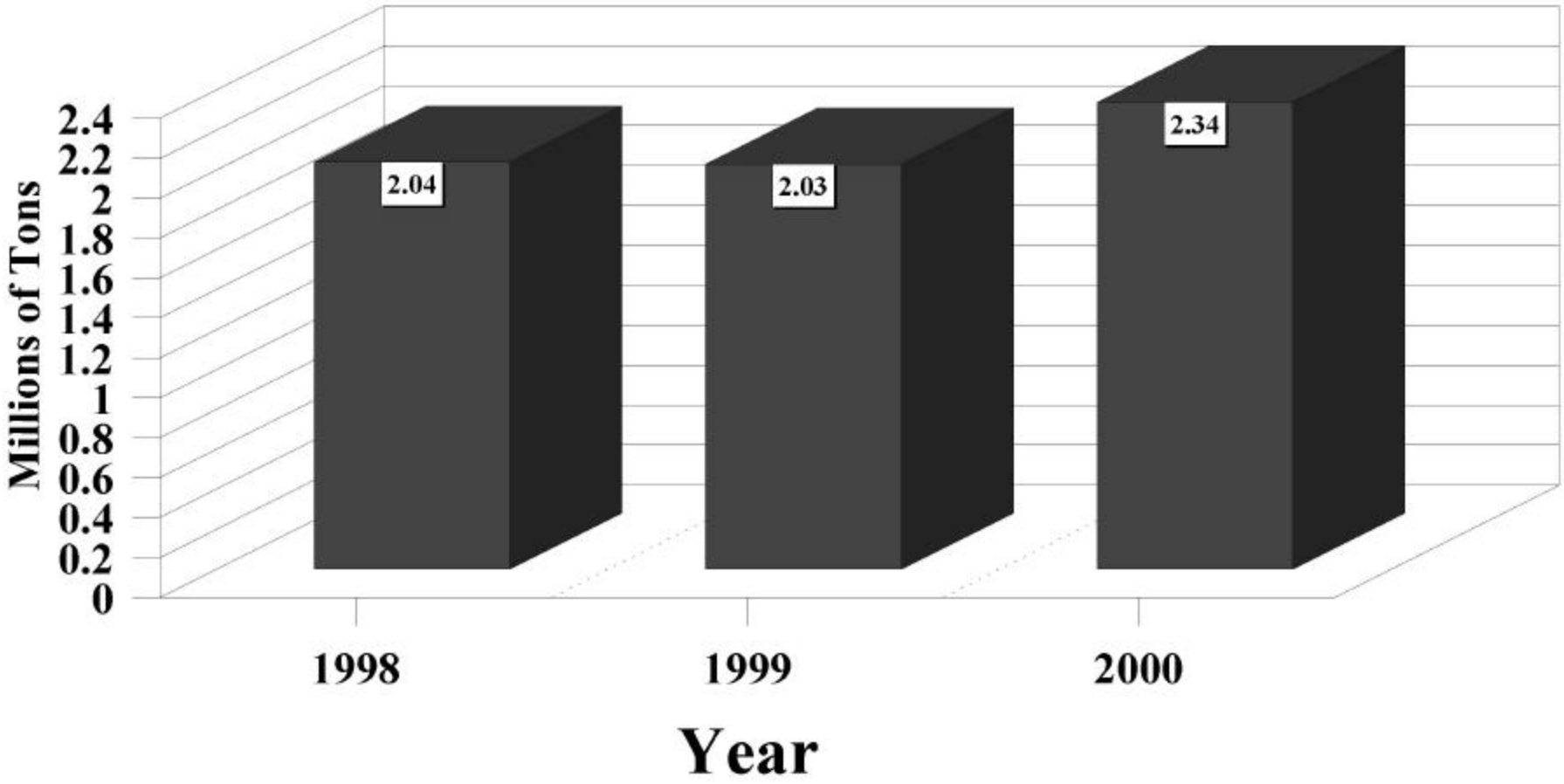
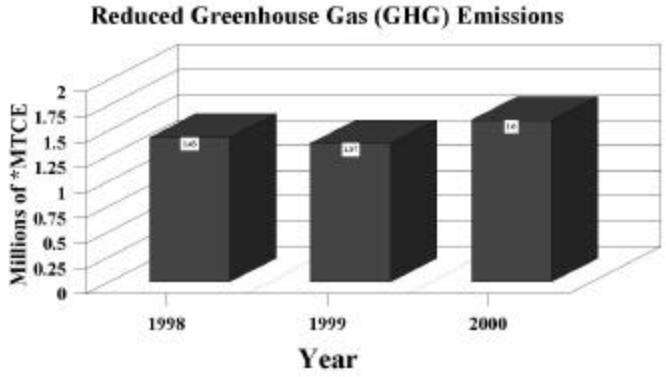
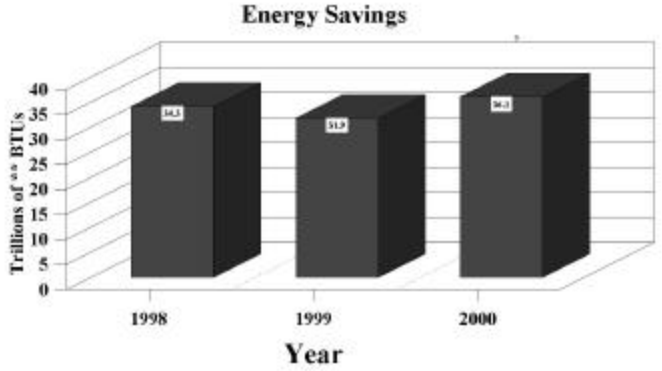
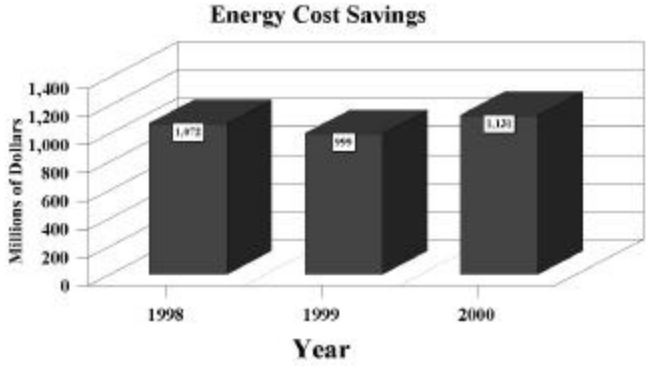

Recycled Municipal Solid Waste (MSW)
Millions of Tons
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
2.04
2.03
2.34
1998
1999
2000
Year

Figure 1



*The principal GHGs are carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O). Because these gases differ in their ability to trap heat, one ton of emissions of CO2 has a different effect than one ton of emissions of CH4. To express emissions of the different gases in a comparable way, atmospheric chemists often use a weighting factor called global warming potential. The heat-trapping ability of one metric ton (1,000 kilograms) of CO2 is taken as the standard, and commonly emissions are expressed in terms of metric tons of carbon equivalent (MTCE).





**British Thermal Units (BTU): The quantity of heat required to raise the temerature of one pound of water by one degree Fahrenheit>

Figure 2